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Parasitic Helminths from Paraguay XII: *Aplectana* Railliet & Henry, 1916 (Nematoda: Cosmocercoidea) from frogs

by

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With 3 figures

ABSTRACT

Four species of *Aplectana* Railliet & Henry, 1916 (Cosmocercoidea: Cosmocercidae) were recovered from frogs of Paraguay: *A. hylambatis* (Baylis, 1927) from *Bufo paracnemis* Lutz, *Dermatonotus muelleri* (Boettger), *Physalaemus biligonigerus* (Cope), *Leptodactylus mystacinus* (Burmeister), *L. elenae* Heyer, *L. ocellatus* (Linnaeus), *L. fuscus* (Schneider), *L. chaquensis* Cei, *L. bufonius* Boulenger; *A. macintoshii* (Stewart, 1914) from *Leptodactylus mystacinus* and *L. bufonius; A. elenae* n. sp. and *A. paraelenae* n. sp. from *Leptodactylus elenae.* This is the first report of *A. macintoshii* in South American frogs. It is suggested that the following species are synonymous with *A. hylambatis: Oxysomatium bonariensis* Gutierrez, 1945, *Aplectana pudenda* Masi Pallarés & Maciel, 1974. Similarly the following species are synonymous with *A. macintoshii: Neyraplectana ranae* Wang, Zhao & Chen, 1978, *Neoraillietnema ranae* Wang, 1980. In *A. elenae* n. sp. the male caudal papillae are surrounded by minute cuticular bosses. Only *Aplectana acuminata* from the Old World has caudal papillae similar to *A. elenae,* but these species are easily distinguished by differences in the shape of the tail and spicules. *A. paraelenae* n. sp. most closely resembles *A. papillifera* (Araujo, 1976) from South American snakes. It may be distinguished from this species by the number and distribution of caudal papillae and by spicule morphology.

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INTRODUCTION

Four *Aplectana* species recovered from Paraguayan frogs are reported herein. The material was collected during the Museum of Geneva expedition of 1979 (participants F. Baud, V. Mahnert, J.-L. Perret and C. Vaucher, Geneva; C. Dlouhy, Asuncion).

DESCRIPTION OF SPECIES

Aplectana hylambatis (Baylis, 1927) Travassos, 1931

NEW SYNONYMS: *Oxysomatium bonariensis* Gutierrez, 1945; *Aplectana pudenda* Masi Pallarés & Maciel, 1974.

Material examined: From *Bufo paracnemis,* 6 of 9 positive, MHNG field number *PY 1* (110♂, ♀), *172* (102♂, ♀), *176* (33♂, ♀), *196* (32♂, ♀), *197* (28♂, ♀); from *Dermatonotus muelleri,* 3 of 3 positive, *2, 554, 562* (each with >200 worms); from *Physalaemus biligonigerus,* 1 of 1 positive, *574* (3♂, 6♀); from *Leptodactylus mystacinus,* 4 of 4 positive, *4* (63♂, ♀), *5* (21♂, 9♀), *15* (107♂, ♀), *16* (3♂, 8♀); from *L. elenae,* 1 of 11 positive, *10* (8♂, 9♀); from *L. ocellatus,* 2 of 5 positive, *35* (2♂, 1♀), *36* (1♂); from *L. fuscus,* 1 of 6 positive, *129* (>200♂, ♀, larvae); from *L. chaquensis,* 2 of 16 positive, *100* (1♂, 2♀, 23 larvae), *275* (9♂, 19♀, 22 larvae); from *L. bufonius,* 9 of 9 positive, *199* (5♂, 12♀), *200* (3♂, 4♀), *234* (47♂, ♀), *235* (3♂, 1♀), *236* (1♂, 16♀), *237* (2♂, 2♀), *238* (2♀), *240* (4♂, 4♀), *241* (2♀).

New host records: *B. paracnemis, D. muelleri, P. biligonigerus, L. mystacinus, L. elenae, L. ocellatus, L. fuscus, L. chaquensis, L. bufonius.*

Localities and dates: San Lorenzo (Central prov.), 4.X. and 12.XI.1979; Estancia Estrellas (Concepcion prov.), 15-16.X.1979; 20 km South E. Estrellas (Concepcion prov.), 16-18.X.1979; 10 km North Coronel Oviedo (Caaguazu prov.), 9.X.1979; Bella Vista (Amambay prov.), 11-12.X.1979; Estancia El Postillon, Puerto Max (Concepcion prov.), 19.X.1979.

Registration numbers of *A. hylambatis:* MHNG 979.722-749.

Discussion: Since an adequate redescription of this species based in part on specimens from South America was published recently (BAKER 1980*b*), we do not give a full redescription here. Illustrations of the male caudal end are given in fig. 1.

A. hylambatis was originally described from the frog *Leptopelis aubryi* from Guinea, Africa. It has subsequently been reported in an African species of toad from the London Zoo *(Bufo mauritanicus)* and in *Bufo achalensis* of Cordoba, Argentina (BAKER 1980*b*). *Oxysomatium bonariensis* Gutierrez, 1945, described from *Bufo arenarum* of Argentina and subsequently reported in *B. arenarum* and *B. dorbignyi* of Uruguay (LENT & FREITAS 1948), is herein designated a synonym. Although the type specimens were not examined, the description by GUTIERREZ (1945) is detailed enough to permit this synonymy. *Aplectana pudenda* MASI PALLARÉS & MACIEL, 1974, described from *Bufo paracnemis, Leptodactylus ocellatus, Hyla spegazzini,* and *H. punctata* of Paraguay (no precise localities) is similarly synonymized with *A. hylambatis.* The only character in the original description distinguishing it from *A. hylambatis* is the presence of an extra pair of large sublateral preanal papillae beside the subventral paired rows of papillae which does not occur in *A. hylambatis.* However, these papillae may have been confused with the small somatic papillae which occur in this location in *A. hylambatis* and other *Aplectana* species. MASI

PALLARÉS & MACIEL (1974) did not mention any somatic papillae in their description. Also, in the present study two of the species given as hosts for *A. pudenda* in Paraguay *(L. ocellatus, B. paracnemis)* were found to harbour only *A. hylambatis.*

It is of interest to note that in *Leptodactylus mystacinus* and *L. bufonis* of Paraguay, *A. hylambatis* is commonly coparasitic with *Cosmocerca ornata* Diesing, 1861 (see BAKER & VAUCHER 1984), and *Aplectana macintoshii* (see below). Both these latter species share with *A. hylambatis* a geographical distribution which includes both southern South America and Africa, but excludes North America for both species and Eurasia for *A. hylambatis.* This is not known for any other nematode parasites of vertebrates, except parasites of domesticated or introduced animals and man.

Aplectana macintoshii (Stewart, 1914) Travassos, 1931

NEW SYNONYMS: *Neyraplectana ranae* Wang, Zhao & Chen, 1978; *Neoraillietnema ranae* Wang, 1980.

Material examined: From *Leptodactylus mystacinus,* 2 of 4 positive, MHNG field number *PY 4* (3♂, 14♀), *5* (1♂, 8♀); from *L. bufonius,* 5 of 9 positive, *199* (1♂, 11♀), *234* (1♂, 5♀), *235* (3♂, 27♀), *237* (1♂, 10♀), *240* (1♂, 10♀).

New host records: *Leptodactylus mystacinus, L. bufonius.*

Localities and dates: San Lorenzo (Central prov.), 4.X.1979; 20 km South Estancia Estrellas (Concepcion prov.), 16-18.X.1979.

Registration numbers of *A. macintoshii:* 979.750-756.

Description (fig. 1): This species has been redescribed in detail based on specimens from Old World hosts (BAKER 1980*b*) and therefore a formal redescription is not provided here. No differences in morphology between specimens from Paraguay and the Old World were detected. Measurements of three males and 14 females (from *Leptodactylus mystacinus, PY 4*) as follows similarly show no significant differences: *Males* — total length 0.98-1.69 mm; oesophagus 273-320 µm long; nerve ring 120-136 µm and excretory pore 198-237 µm from anterior extremity; tail 164-197 µm, spicules 11-172 µm and gubernaculum 26-32 µm long. *Females* — total length 2.64-3.39 mm; oesophagus 500-515 µm long; nerve ring 180-190 µm, excretory pore 360-420 µm and vulva 1.27-1.56 mm from anterior extremity; tail 500-555 µm long.

Discussion: *A. macintoshii* was described originally in frogs from India. It has subsequently been reported in a wide variety of frogs and rarely in lizards and snakes of Eurasia and Africa (BAKER 1980*b*, 1981), but it has not previously been reported in the New World. To the already long list of synonyms (see BAKER 1980*b*) we add the following two species described from frogs of China: *Neyraplecana ranae* Wang, Zhao & Chen, 1978, *Neoraillietnema ranae* Wang, 1980. As mentioned above, the present report raises to three the number of cosmocercoids known to have an Old and New World distribution. In the Old World the geographical and host distribution of *A. macintoshii* closely parallels that of *Cosmocerca ornata* (see BAKER & VAUCHER 1984). It is of interest to note that a similar coparasitic association occurs in Paraguay.

Recently GRABDA-KAZUBSKA (1985) redescribed *A. macintoshii* (identified as *Neyraplectana schneideri* (Travassos, 1931)) based on specimens from *Bufo bufo* of Poland. Unfortunately no reference was made to the revision (BAKER 1980*b*) in which *N. schneideri* was shown to be a synonym of *A. macintoshii.* GRABDA-KAZUBSKA also attempted to validate the genera *Neyraplectana* Bállesteros-Marquez, 1945, and

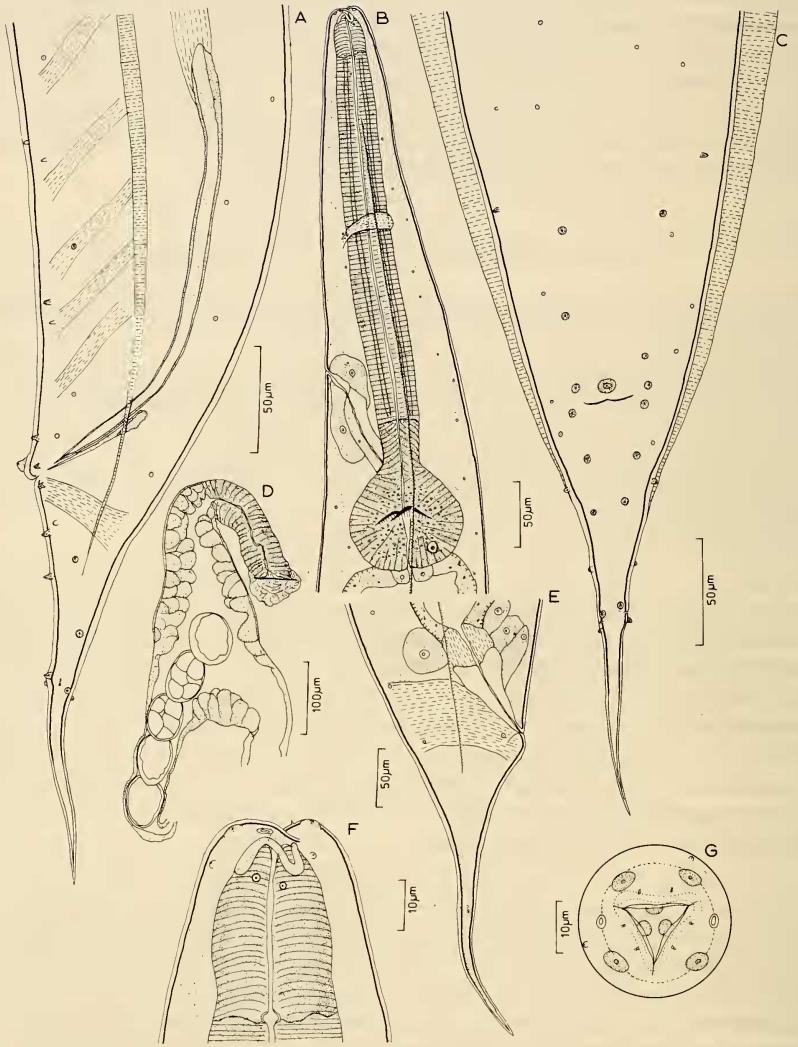

FIG. 1.

Aplectana macintoshii (Stewart, 1914) Travassos, 1931. A, B, caudal end of male, ventral and lateral view. *Aplectana hylambatis* (Baylis, 1927) Travassos, 1931. C, D, caudal end of male, lateral and ventral view.

Neoraillietnema Bállesteros-Marquez, 1945, which were synonymized with *Aplectana* by Chabaud (1978). Grabda-Kazubska differentiated *Neyraplectana* from *Aplectana* by a supposed lack of a gubernaculum. However all Cosmocercinae possess this structure, although in species such as *A. macintoshii,* it may be weakly sclerotized and inconspicuous. Grabda-Kazubska (1985) differentiated *Neoraillietnema* from *Aplectana* on the basis that the spicules are reduced, and females are "prodelphic". The first character is of no taxonomic value since spicule size is highly variable in *Aplectana.* Similarly the second character is valueless since the ovaries of the type species are both anterior to the vulva (see Le-Van-Hoa 1962) as in *Aplectana.* Problems with using the terms "prodelphic" and "amphidelphic" as applied to the Cosmocercinae were reviewed by Baker (1980*a*).

Aplectana elenae n. sp.

Type material: MHNG 979.757 (holotype ♂) and 979.758 (paratype ♀ and allotype ♀).

Host of type: *Leptodactylus elenae* (MHNG field number *PY 61*).

Locality and date: 10 km North Coronel Oviedo (Caaguazu prov.), 9.X.1979.

Other material: From *L. elenae,* 3 of 11 positive, *60* (1 ♀), *250* (2 ♂, 11 ♀).

Localities and dates: As type material and 20 km South Estancia Estrellas (Concepcion prov.), 17-18.X.1979. Registration numbers: 979.759-760.

D e s c r i p t i o n (fig. 2): Cosmocercinae. Oral opening triangular, three small lips present, each with cuticular flange on inner margin. Cephalic extremity with four large cephalic papillae and six minute inner labial papillae visible only in apical view. Anterior extremity of oesophagus in form of three blunt protuberances covered with single apical ring of cuticle, inner margin of each protuberance bearing prominent tooth-like projection. Lateral alae prominent in both sexes, extending from pharyngeal portion of oesophagus to anterior portion of tail. Somatic papillae numerous.

M a l e (holotype): Total length 2.55 mm. Length of oesophagus 444 µm. Nerve ring 210 µm and excretory pore 233 µm from anterior extremity. Maximum width of lateral alae 12 µm. Subventral preanal caudal musculature absent. Tail 273 µm long, tapering abruptly in proximal third to spike-like distal portion. Caudal papillae (except unpaired papilla on anterior lip of anus) differentiated from somatic papillae by being surrounded by double row of minute bosses. Caudal papillae distributed as follows: tail with five pairs, one pair and unpaired papilla adanal, eight pairs preanal. Spicules 97 µm long, with markedly large proximal knob and tapering distally into finely attenuated point. Gubernaculum 28 µm long, weakly sclerotized.

F e m a l e (allotype): Total length 3.64 mm. Length of oesophagus 545 µm. Nerve ring 216 µm, excretory pore 269 µm and vulva 1.87 mm from anterior extremity. Maximum width of lateral alae 15 µm. Tail 296 µm long, tapering abruptly in proximal third to spike-like distal portion. Vagina directed anteriorly in proximal quarter, remainer flexed posteriorly, thick-walled in proximal half, thin-walled distally. One uterus directed anteriorly, the other directed posteriorly, both ovaries located anterior to vulva. Uteri containing many eggs. Eggs 79-100 µm long and 44-48 µm wide (based on five specimens), thin-walled, containing fully developped larvae; free larvae not observed *in utero.*

O t h e r s p e c i m e n s : Measurements of 2 males and 10 females are as follows:

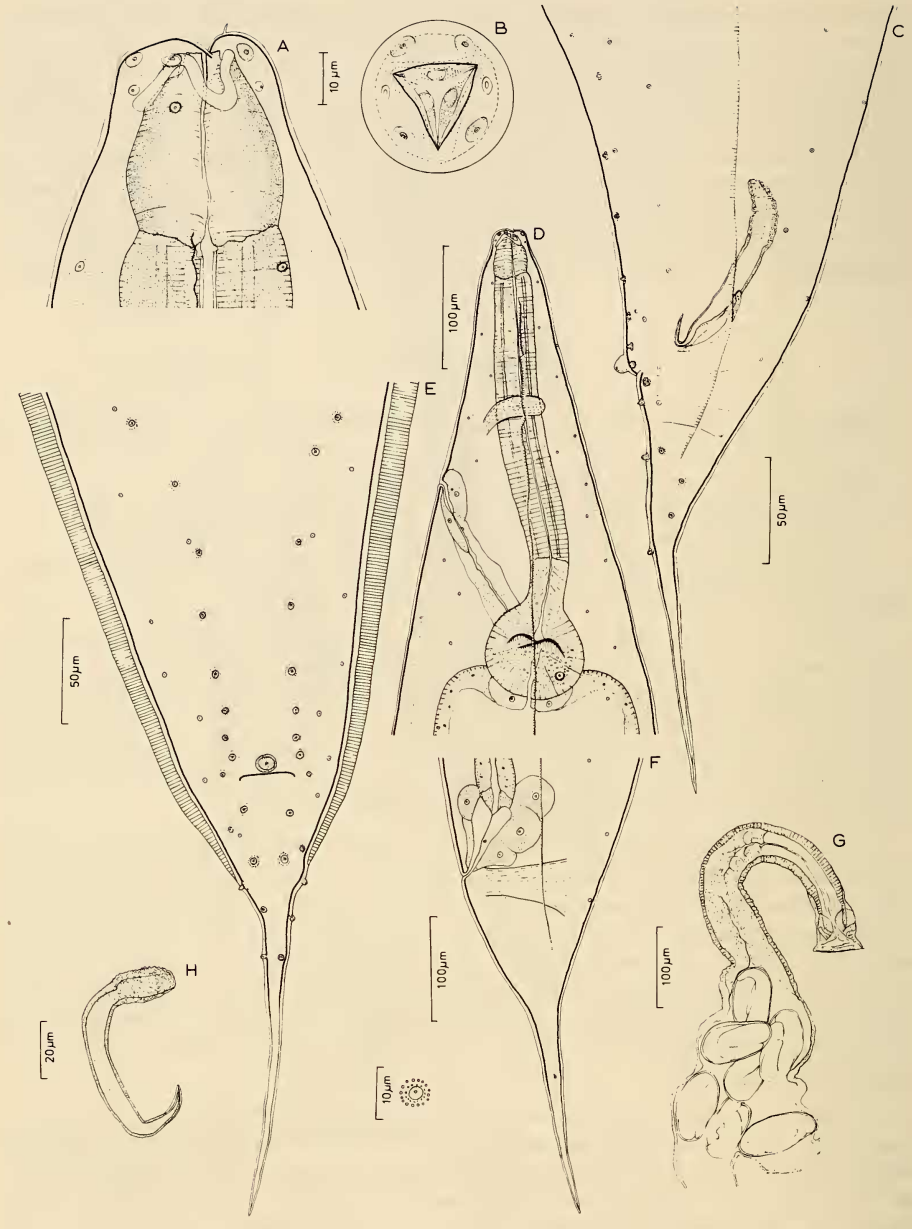

FIG. 2.

Aplectana elenae n. sp. A, B, cephalic extremity, lateral and apical view. C, caudal end of male, lateral view. D, anterior end of male, lateral view. E, caudal end of male, ventral view. F, tail of female, lateral view. G, vagina, ventral view. H, spicule of male, lateral view showing variability in shape.

Males — Total length 1.48-1.68 mm; oesophagus 343-375 µm long, nerve ring 101-147 µm, excretory pore 168-202 µm from anterior extremity; spicules 108-116 µm, gubernaculum 42-43 µm and tail 197-204 µm long.

Females — Total length 2.07-3.39 mm; oesophagus 479-511 µm long; nerve ring 140-164 µm, excretory pore 234-237 µm and vulva 1.19-1.72 mm from anterior extremity; tail 238-371 µm long.

D i s c u s s i o n : *A. elenae* n. sp. is easily differentiated from all other *Aplectana* species except *A. acuminata* (SCHRANK 1788) from Palaearctic frogs in the possession of male caudal papillae surrounded by minute bosses (BAKER 1980*b*). It may be differentiated from *A. acuminata* by possessing markedly different spicules and by the shape of the male tail (conical in *A. acuminata,* spike-line in *A. elenae*). Also in *A. acuminata* bosses occur around only a few of the preanal papillae, whereas in *A. elenae* they also occur around postanal papillae. In South America *A. elenae* most closely resembles *A. vellardi* Travassos, 1926, from *Bufo marinus* of Sao Paulo, Brazil, especially in the shape of the male tail and in possessing spicules with a prominent proximal knob. However, these species differ in the number, distribution and shape of the male caudal papillae (apparently not surrounded by cuticular bosses in *A. vellardi*).

The presence of bosses surrounding the male caudal papillae in *A. elenae* and *A. acuminata* indicate a possible relationship of these two species to the genus *Cosmocercoides. Cosmocercoides* is differentiated by the possession of rosette papillae (absent in *Aplectana*) (CHABAUD 1978). In *Cosmocercoides,* however, the circles of bosses surrounding the papillae are relatively large and therefore the rosette papillae are prominent features. In contrast, the bosses observed in *A. eleneae* and *A. acuminata* are minute and easily overlooked.

Aplectana paraelenae n. sp.

Type material: MHNG 979.761 (holotype ♂); 979.762 (allotype ♀ and 6 paratype ♀).
Host of type: *Leptodactylus elenae* (MHNG field number *PY 63*). One of 11 positive.
Locality and date: 10 km North Coronel Oviedo (Caaguazu prov.), 9.X.1979.

D e s c r i p t i o n (fig. 3): Cosmocercinae. Oral opening triangular, three small lips present, each with cuticular flange on inner margin. Cephalic extremity with four large cephalic papillae and six minute inner labial papillae visible only in apical view. Anterior extremity of oesophagus in form of three blunt protuberances covered with apical ring of cuticle. Inner margin of each protuberance bearing small tooth-like projection. Lateral alae prominent in both sexes, extending from just posterior to pharyngeal portion of oesophagus to anterior third of tail. Somatic papillae numerous.

M a l e (holotype): Total length 2.08 mm. Length of oesophagus 427 µm. Nerve ring 164 µm and excretory pore 280 µm from anterior extremity. Maximum width of lateral alae 20 µm. Subventral preanal caudal musculature present, consisting of five pairs of inconspicuous cells. Tail 195 µm long, tapering gradually to spike-like distal portion. Paired caudal papillae differentiated from somatic papillae only by being slightly larger in size. Caudal papillae distributed as follows: tail with three subventral pairs, two subdorsal pairs and one lateral pair; adanal region with one large unpaired papilla on anterior lip of anus and two pairs of papillae lateral to anus; preanal region with three pairs (two closest to anus subventral, other pair sublateral). Spicules 227 µm long, slender, relatively weakly

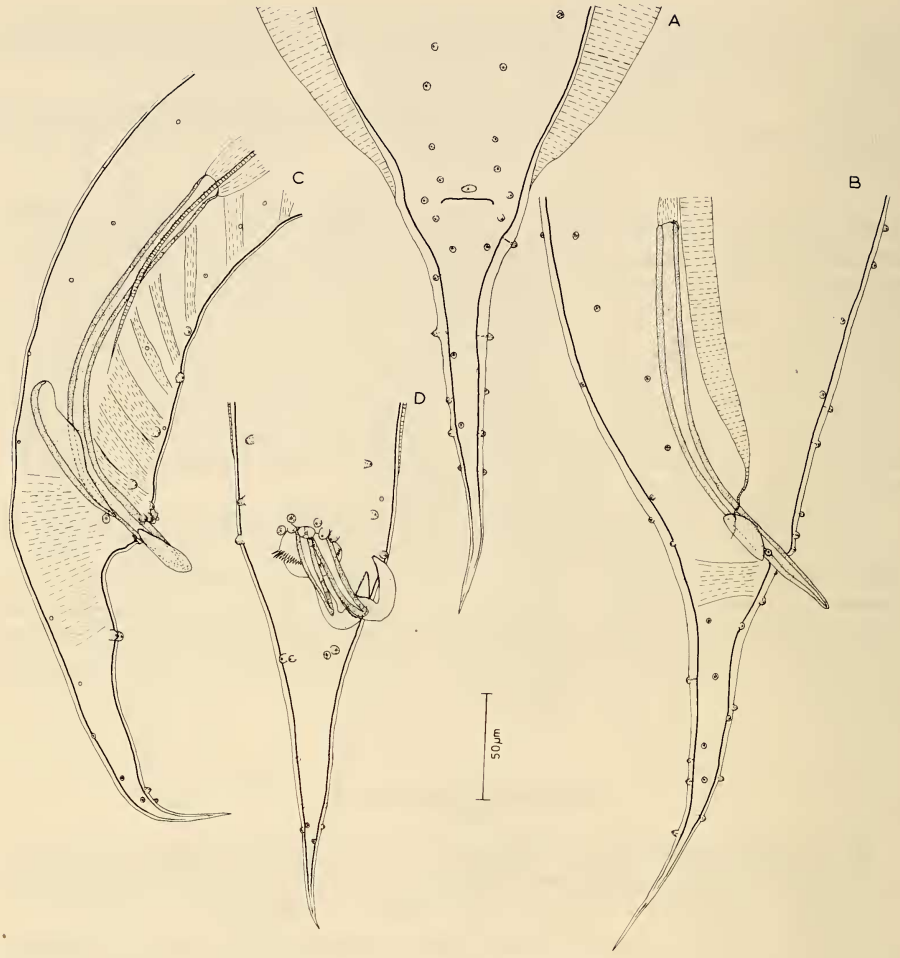

FIG. 3.

Aplectana paraelenae n. sp. A, caudal end of male, lateral view. B, anterior end of male, lateral view. C, caudal end of male, ventral view. D, vagina, ventral view. E, tail of female, lateral view. F, G, cephalic extremity, lateral and apical view.

sclerotized, with sharply pointed distal extremity and blunt proximal extremity thickened on dorsal side of anterior 40 µm of length. Gubernaculum 53 µm long, weakly sclerotized.

F e m a l e (allotype): Total length 3.42 mm. Length of oesophagus 549 µm. Nerve ring 203 µm, excretory pore 370 µm and vulva 1.87 mm from anterior extremity. Maximum width of lateral alae 30 µm. Tail 278 µm long, tapering gradually to spike-like distal extremity. Vagina directed anteriorly in proximal third, remainder flexed posteriorly, muscular in proximal third. One uterus directed directly posteriorly, the other directed posteriorly for 200 µm and then flexed anteriorly; both ovaries located anterior to vulva.

Uteri containing many eggs. Eggs 68-74 µm long and 48-59 µm wide (based on five specimens), thin-walled, containing embryos up to gastrula stage of development. Larvae not observed in eggs or free *in utero.*

Paratypes: Measurements of six females are as follows:

Total length 2.44-3.55 mm; oesophagus 512-564 µm long, nerve ring 174-177 µm, excretory pore 297-359 µm and vulva 1.38-1.98 mm from anterior extremity; tail 287-327 µm long.

Discussion: *A. paraelenae* n. sp. most closely resembles *A. papillifera* (Araujo, 1976), described from the snakes *Dromicus typhlus* and *Xenodon neuwiedii* of Brazil (no precise locality). It may be differentiated from this species, however, by the following characters: fewer adanal and preanal caudal papillae in males, spicules which are more slender distally and shaped differently at the proximal end, a relatively more prominent oesophageal bulb.

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